LTraffic Limited Cuckoo RMS User Manual

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Contents

1.0 Introduction 4
1.1 Function 4
2.0 Purpose of the document 4
3.0 Construction 4
4.0 Hardware 4
4.1 Central Processor Unit 4
4.2 Daughter Expansion 6
4.3 Power Supply Unit 7
4.4 Battery Backup 7
5.0 Installation 7
5.1 Electrical 8
6.0 Commissioning 8
6.1 Syncing to the GUI 8
6.2 Validating Installation 8
6.3 Configuring the I/O 11
7.0 Operation 12
7.1 General Operation 12
7.2 Communications 13
7.3 Engineers Terminal 14
7.4 GUI Navigation 14
8.0 Problem Solving 15
9.0 Specification 16

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Abbreviations

RMS	**Remote Monitoring System**
CPU	**Central Processing Unit**
GUI	**Graphical User Interface**
RTC	**Real-time Clock**
I/O	**Input / Output**
LED	**Light Emitting Diode**
3G	**Third Generation Data Connection**
ADSL	**Asymmetric Digital Subscriber Line**
GPRS	**General Packet Radio Service**
GPS	**Global Positioning System**
AC	**Alternating Current**
DC	**Direct Current**
RS232	**Recommended Standard Serial Connection**
RS485	**Recommended Standard Serial Connection**
USB	**Universal Serial Bus**
Cuckoo	**LTraffic Outstation Monitoring Unit**
IP	**Internet Protocol**
SIM	**Subscriber Identity Module**

Figure Reference

Figure 1	**Cuckoo Processor Side A**
Figure 2	**Cuckoo Processor Side B**
Figure 3	**Cuckoo I/O Daughter Expansion PCB Side A**
Figure 4	**Cuckoo I/O Daughter Expansion PCB Side B**
Figure 5	**I/O Wiring Loom Diagram**
Figure 6	**Cuckoo GUI Login Page**
Figure 7	**Cuckoo GUI Dashboard Page**
Figure 8	**Cuckoo GUI Points Table Page**
Figure 9	**Cuckoo GUI Site Specific Page**
Figure 10	**Cuckoo GUI Icon Reference Table**
Figure 11	**System Communication Diagram**
Figure 12	**Telnet Login Page**

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1.0 Introduction

1.1 Function

The Cuckoo RMS is an IP based Remote Monitoring System designed to provide live monitoring of traffic signal intersections and pedestrian controllers. The system is capable of monitoring all current UK traffic controllers.

The Cuckoo interfaces with the traffic signal controllers through serial RS232 and/or I/O to provide accurate and reliable fault reporting.

The outstation can communicate with the cuckoo server using the following communication methods:

- 3G using an antenna
- Fibre
- ADSL

2.0 Purpose of the document

This document explains the installation, setup and navigation of the Cuckoo Remote Monitoring System.

3.0 Construction

The Cuckoo RMS unit consists of a 3U Euro card size processor PCB and optional I/O daughter expansion PCB. Also in a complete kit would be 2 x RS232 looms. One to be connected to the cuckoo front panel for handset communication through the cuckoo and one connected from the rear of the cuckoo processor to the controller's handset port for live fault analysis of the controller.

4.0 Hardware

4.1 Central Processor Unit

The CPU (LTCPU) is 24VDC powered and uses a TI MSP 430 ultra-low power processor.

The Cuckoo processor has 6 visual indicator LED's (figure 1), engineers serial terminal port, built in IP modem and 3G SIM card slot. The CPU also include an RS485 connector for connection of I/O daughter expansion PCB's.

At the top right of the processor sits the RS232 ports, the left port is connected to the Cuckoo's front panel and the right port through to the controller's handset port.

The SIM card is located adjacent to the 3G modem**.**

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Figure 1

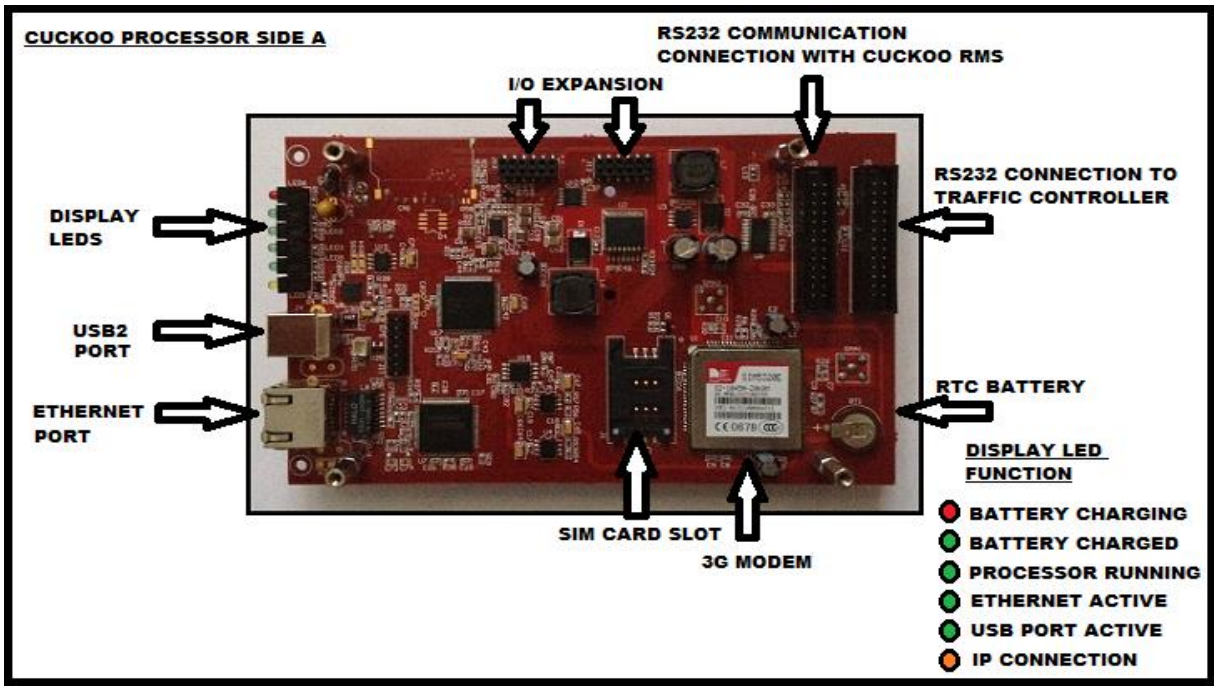
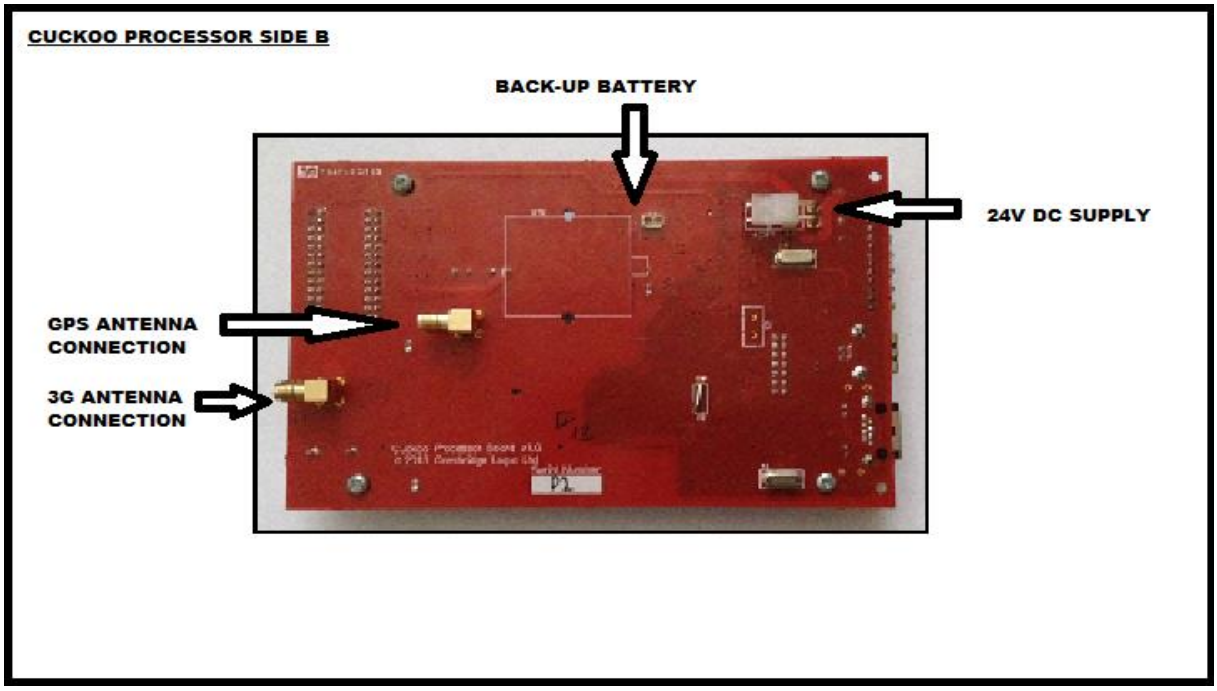


Figure 2



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4.2 Daughter Expansion

Each I/O expansion daughter PCB (LTIO16) allows for up to 16 digital inputs and 16 isolated outputs, the system can have up to two cards which do not require link addressing.

Figure 3

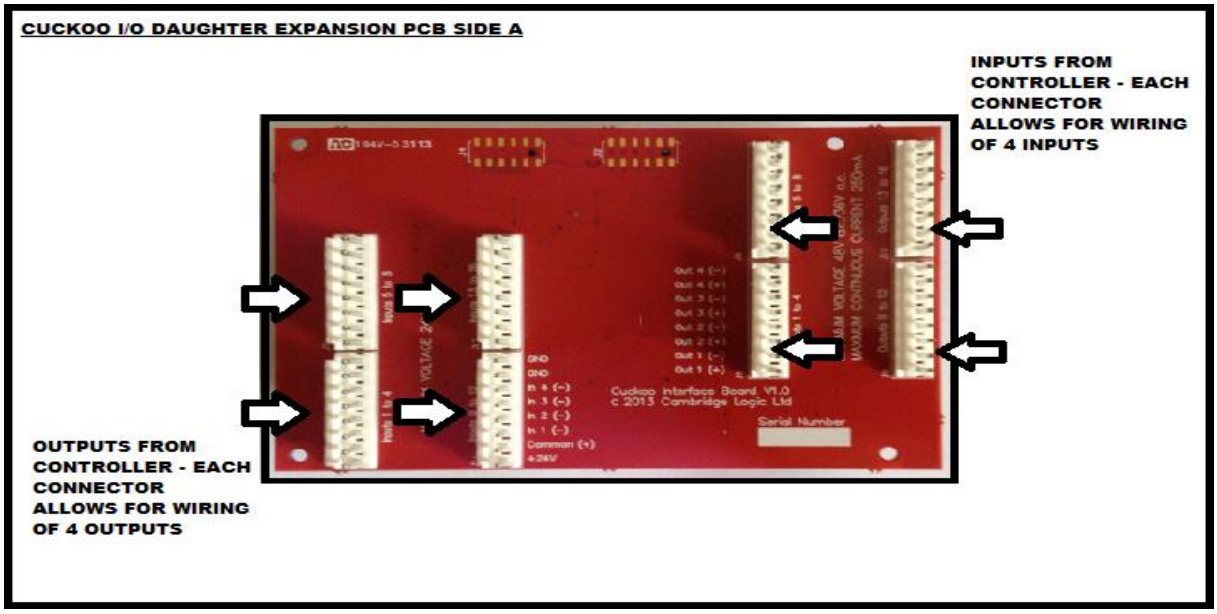
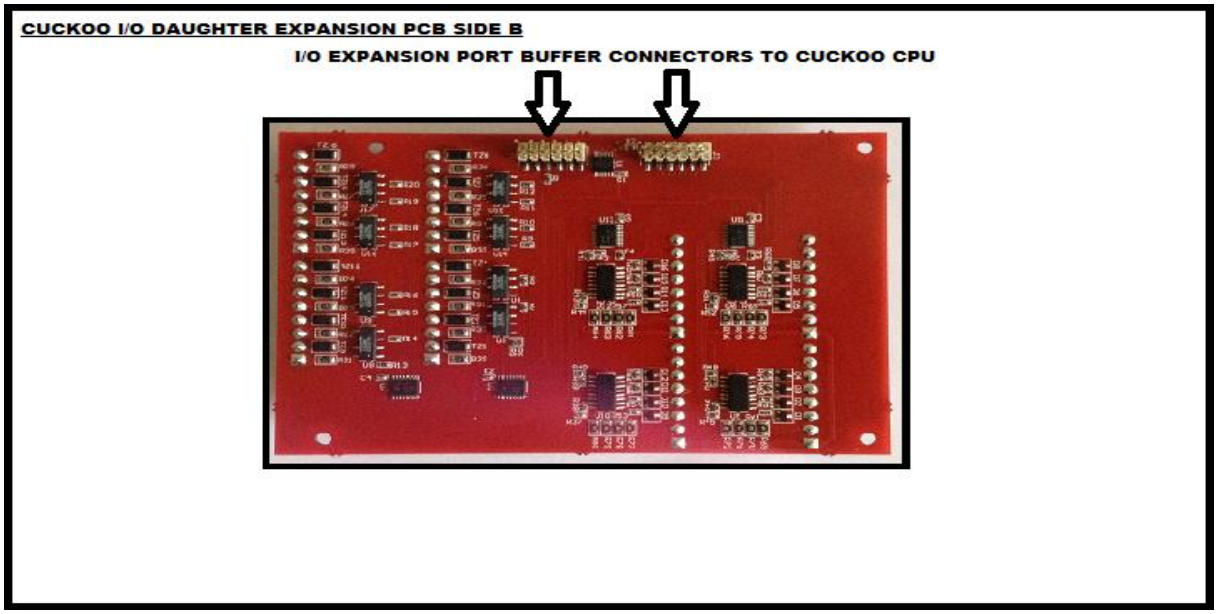

CUCKOO I/O DAUGHTER EXPANSION PCB SIDE A
INPUTS FROM CONTROLLER - EACH CONNECTOR ALLOWS FOR WIRING OF 4 INPUTS
OUTPUTS FROM CONTROLLER - EACH CONNECTOR ALLOWS FOR WIRING OF 4 OUTPUTS

Figure 4



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4.3 Power Supply Unit

The outstation unit is powered by an independent DIN rail mounted PSU (LTPSU). The power supply is installed as part of the Cuckoo installation, the 24VDC output from the PSU connects to the back of the Cuckoo Processor (figure 2).

4.4 Back-up Battery

The outstation has a back-up battery (LTBATT) facility that allows the unit to send last gasp messages back to the GUI in the event of mains supply failures. The battery is capable of powering the Cuckoo for approximately 15 minutes, allowing time to connect to the GUI in such an event to prove the communication to the controller is no longer operational.

5.0 Installation

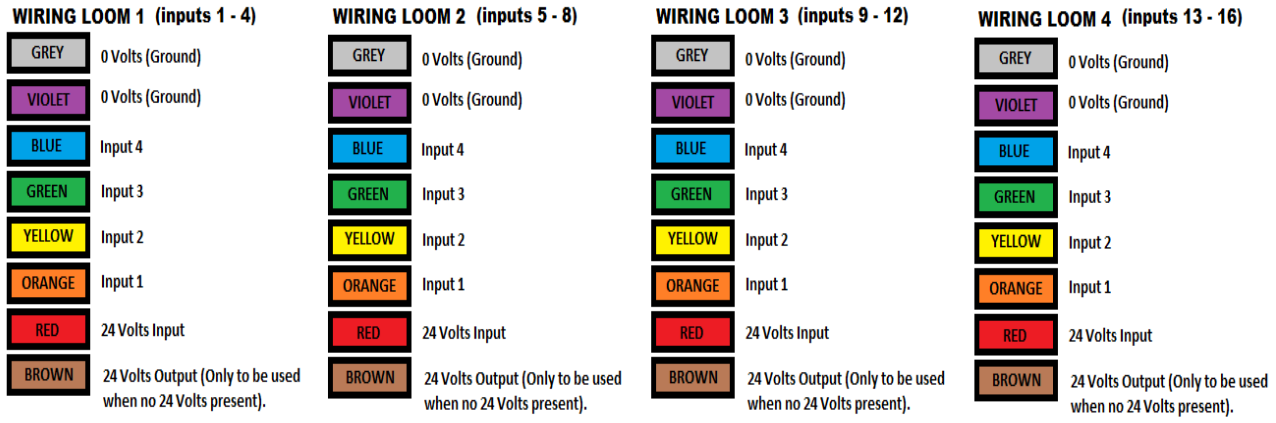
The Cuckoo unit comes preassembled and should be installed within a 3U rack connecting the unit to the rack using the available screw terminals on the Cuckoo front panel.

Wire the I/O card as per the client's specification. Each I/O port from the cuckoo allows up to 4 inputs and/or outputs (Figure 5.) The user only needs to connect the required cores, ensuring a 0-volt (ground) is also connected to the Traffic Controller's ground. Use cable ties to ensure the installation is neat and tidy.

Install the din rail mounted PSU safely and connect the 24VDC output to the Cuckoo processor as per (figure 2). Supply to the Cuckoo can be confirmed via the processor run LED (figure 1).

Connect the rear RS232 cable from the Cuckoo onto the controller's handset port and confirm through port communication to the controller. Use a terminal/laptop to communicate through the Cuckoo to the controller.

Figure 5


WIRING LOOM 1 (inputs 1 - 4)
GREY 0 Volts (Ground)
VIOLET 0 Volts (Ground)
BLUE Input 4
GREEN Input 3
YELLOW Input 2
ORANGE Input 1
RED 24 Volts Input
BROWN 24 Volts Output (Only to be used when no 24 Volts present).
WIRING LOOM 2 (inputs 5 - 8)
GREY 0 Volts (Ground)
VIOLET 0 Volts (Ground)
BLUE Input 4
GREEN Input 3
YELLOW Input 2
ORANGE Input 1
RED 24 Volts Input
BROWN 24 Volts Output (Only to be used when no 24 Volts present).
WIRING LOOM 3 (inputs 9 - 12)
GREY 0 Volts (Ground)
VIOLET 0 Volts (Ground)
BLUE Input 4
GREEN Input 3
YELLOW Input 2
ORANGE Input 1
RED 24 Volts Input
BROWN 24 Volts Output (Only to be used when no 24 Volts present).
WIRING LOOM 4 (inputs 13 - 16)
GREY 0 Volts (Ground)
VIOLET 0 Volts (Ground)
BLUE Input 4
GREEN Input 3
YELLOW Input 2
ORANGE Input 1
RED 24 Volts Input
BROWN 24 Volts Output (Only to be used when no 24 Volts present).

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5.1 Electrical

To adhere to Health and Safety requirements the following instructions must be followed

- Installation of the Cuckoo unit should only be attempted by trained personnel with adequate technical knowledge.
- All personnel must follow the installation process explained in this guide.
- If any physical work is conducted on the Cuckoo, the operative must ensure that the supply to the Cuckoo unit has been isolated.

6.0 Commissioning

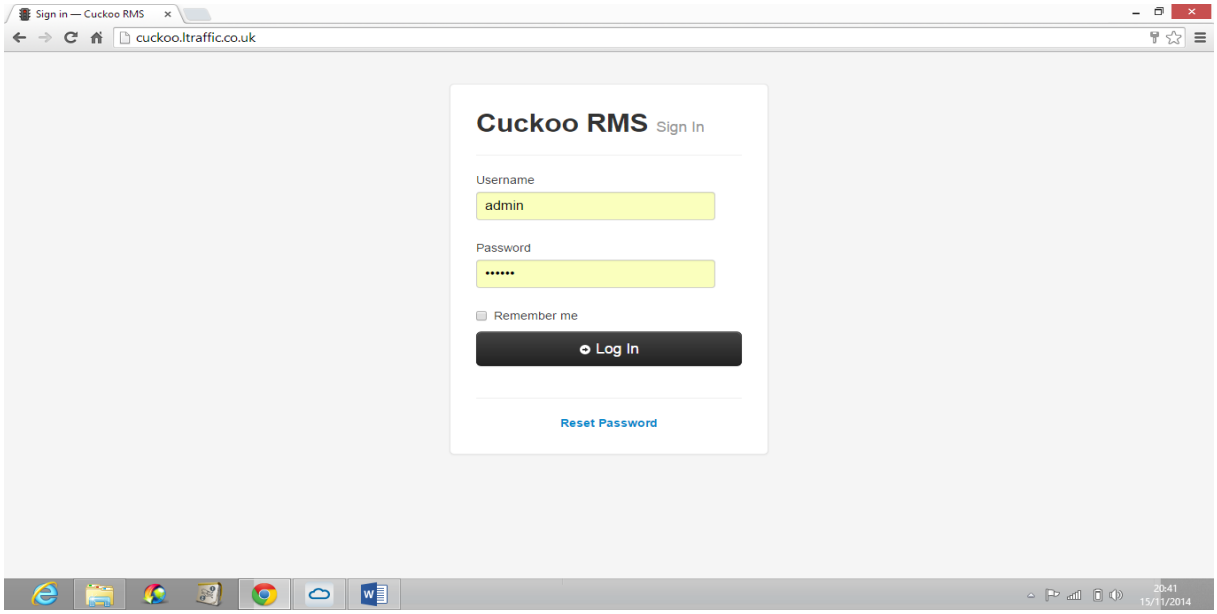
6.1 Syncing to the GUI

The Cuckoo RMS Outstation will automatically sync to the GUI once an IP connection is established. The Cuckoo can either be set-up prior to installation by pre-setting the Cuckoo's user account and site location (long/lat). The Cuckoo can also be set up on site with a laptop once the unit has an established IP connection.

6.2 Validating Installation

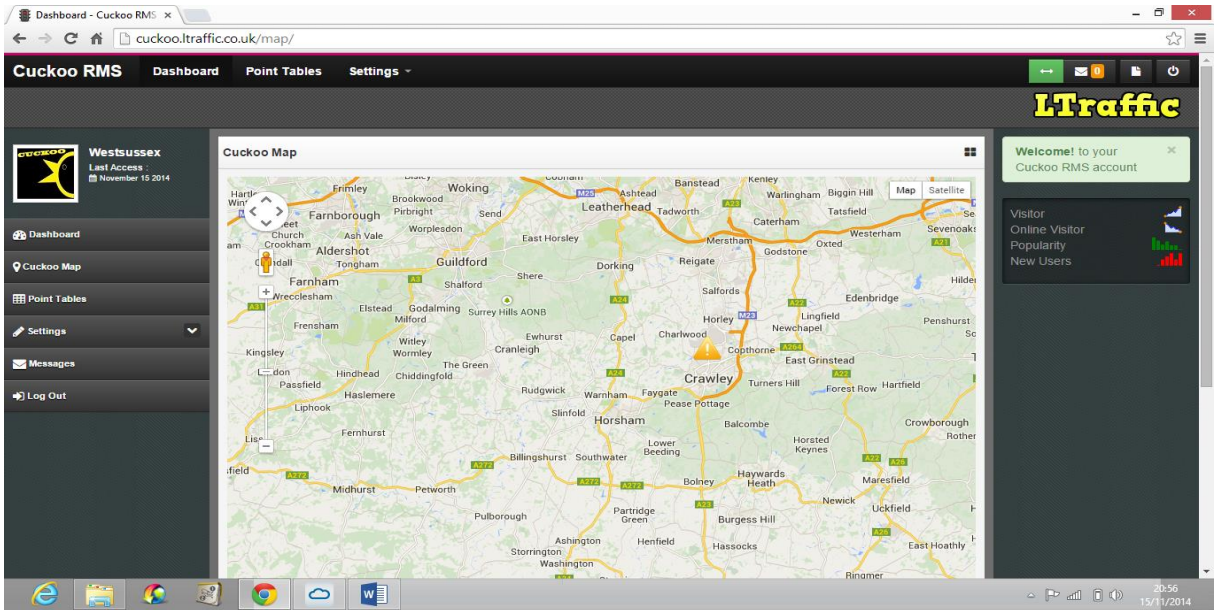
Once the GUI has synced with the Cuckoo outstation, commissioning can commence. The GUI is a responsive website, so can be viewed on any device including mobile phones and tablets. Step 1 is to login to cuckoo.ltraffic.co.uk – Using your Username and Password.

Figure 6



When you have logged in to the GUI, it will display the Cuckoo Dashboard (Figure 7). This will show all the Cuckoo sites on your account.

Figure 7



Once logged into the Dashboard, the sites will display their current fault condition. This page refreshes every 30 seconds. The Cuckoo Map page replicates the Dashboard but will not automatically refresh, allowing the user time to check site information without interruption. The navigation bar on the left part of the screen can be used to navigate throughout the website. By selecting Point Tables (figure 8) a table of sites will be displayed which are registered to the user. The 'Site Link' icon on the Points Table, allows access to the site specific page. This is the page used to commission your selected site.

Within the Site specific page (figure 9), all current and historic faults will be displayed together with the overall site Status (figure 10). When commissioning you should generate a lamp, detector and signals off fault to ensure the following:- all faults are displayed correctly, the correct overall site 'Status' is displayed and the admin user receives E-mail notification of the generated faults. The site specific page refreshes every 30 seconds so faults will be automatically updated, this feature can be switched off by selecting the refresh on/off button at the top left of the page.

If the user has 'offline' (figure 10) as the site Status then the Cuckoo has no 3G connection established. Faults will therefore not be reported until communications are re-established.

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Figure 8

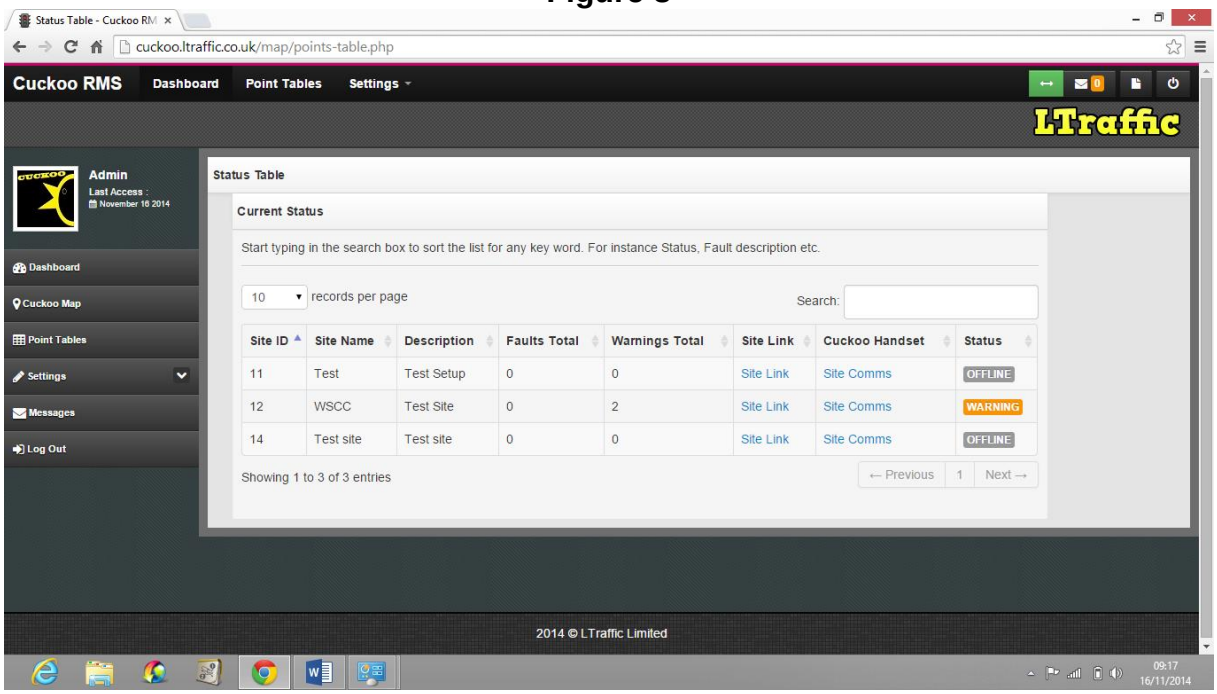
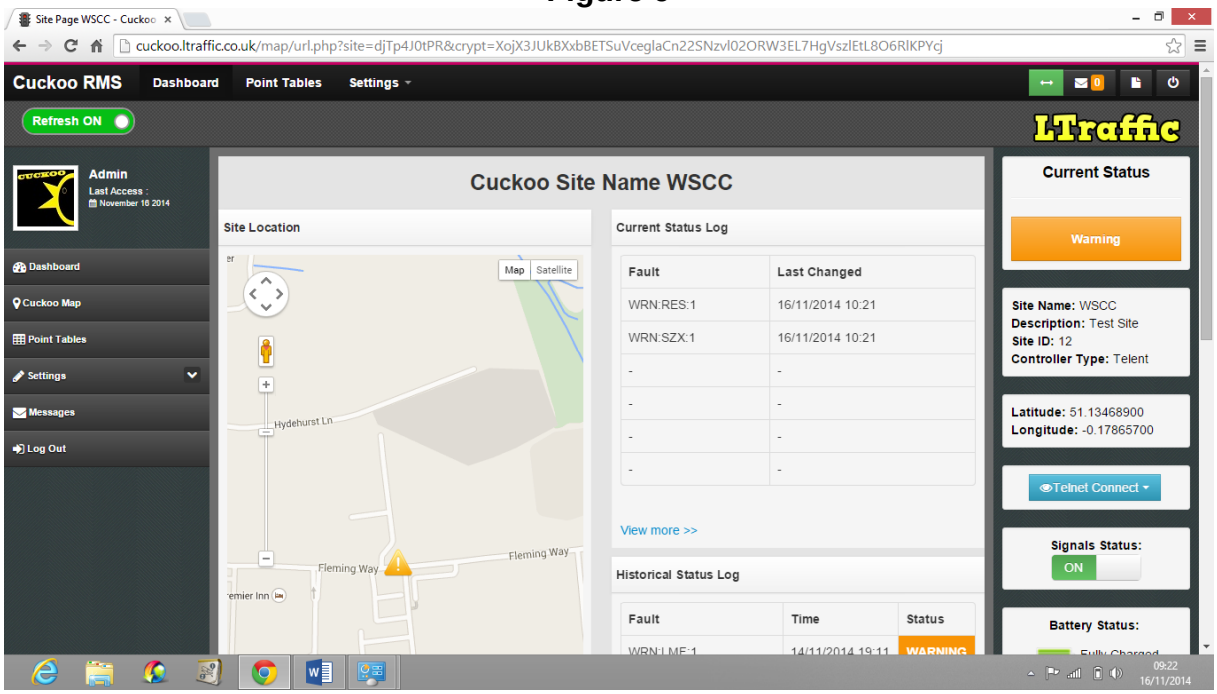


Figure 9



The battery back-up can be tested by removing the supply to the Cuckoo and ensuring the site status changes to ‘Power Fail’ and the below icon is displayed on the GUI.

Throughout the site commissioning the user may see the following GUI icons.

Figure 10

No faults -

Fault on site -

Warning on site -

Engineer/Telnet connected. -

Cuckoo power fail -

Cuckoo offline -

6.3 Configuring the I/O

The Cuckoo can currently be configured with up to 32 inputs with a maximum of two Daughter Expansion cards being added to a Cuckoo outstation unit.

Each I/O bit can be configured through the GUI to display any one of the following:

i. Information Only (Green on activation) – This only shows the I/O as and when activated, no warning or fault will be recorded in any logs.

ii. Warning (Amber on activation) – By configuring I/O bits to warning on activation, the GUI will enter a warning fault into both the 'Current Status Log’ and ‘Historical Status Log’ displaying the configured name.

iii. Fault (Red on activation) – By configuring I/O bits to fault on activation, the GUI will enter a fault into the 'Current Status Log' and ‘Historical Status Log’ displaying the configured name.

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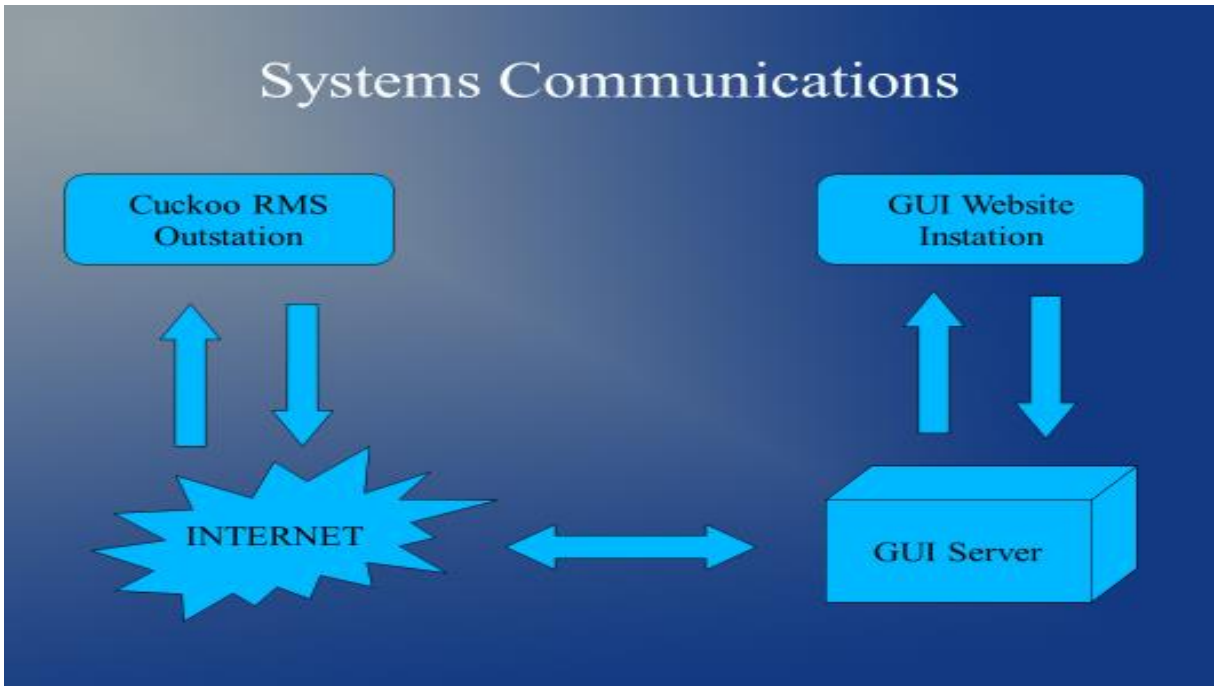
7.0 Operation

The Cuckoo is constantly connected to the LTraffic Cuckoo Server via the internet. Once the initial IP/3G connection has been established, the server will begin to ask the Traffic Controller questions. Any faults or warnings detected will be displayed within the site specific page Fault log. The system also counts total faults and warning and displays this number across the GUI website. As the site overall 'Status' changes this will also be displayed across the GUI website.

Figure 11



7.1 General Operation

The GUI is a responsive website allowing use on any device. In normal operation, the Cuckoo will interrogate the Traffic Controller until any faults appear in the Controllers log and/or an I/O bit changes state. Upon faults occurring, the user will be notified by e-mail or by viewing the site status change on the GUI. The user can open a Telnet communication with a site from the GUI website or any other IP Telnet program. Once the Telnet session is active the Cuckoo 'Status' will change to 'Telnet'. The Telnet session will allow multiple users to view all dialogue from the controller simultaneously.

The server will stop polling the Traffic Controller whenever a Telnet session is initiated or an Engineer is connected to the Cuckoo's RS232 port on site. Once the communication sessions cease the server automatically starts polling/interrogating again.

When an engineer attends site to rectify a fault and connects to the Cuckoo through its RS232 port, the Cuckoo status will change to 'Engineer' on the GUI. Once the fault has been rectified and the

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Engineer has unplugged their terminal, the server will again begin polling/interrogating the controller which will change Cuckoo status accordingly.

Numerous 'fail safes' are configured on the LTraffic server allowing for extremely accurate fault reporting, the system can tell the following.

- If the Cuckoo to Controller RS232 communication lead has been left unplugged.
- Whether someone is communicating remotely through IP (Telnet) or connected through the Cuckoo RS232 port whilst on site.
- If the Battery back-up is operational because of a mains failure.

Echo Telnet sessions are also allowed for maintenance technical support and training.

7.2 Communications

Various communication methods can be used on the Cuckoo. The user can connect remotely via the website from one of the Telnet links across the GUI. The user will be required to set-up their laptop/ computer Telnet handlers to target a Telnet program installed on their machine. This can be completed by following the instructions as follows:

1. Download putty from http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html
2. Enable Telnet client on windows as follows:

- Open **Control Panel**.
- Click **Program and Features** Tab.
- Click Turn **Windows features on or off**.
- Check box for **Telnet Client** and **Telnet Server**.

3. Set putty.exe application to run when links clicked on websites.

- Open **regedit** applications from any windows search menu.
- Click **HKEY_CLASSES_ROOT.**
- Click **telnet.**
- Click **shell.**
- Click **open.**
- Click **command.**
- Now navigate to right hand side of page and '**right click**' (Default) and select **Modify…**
- Change Value Data to **"path\to\putty.exe" %**1 (Path to putty on your system for example "C:\Users\ae-lou_000\Desktop\putty.exe" %1)

Open **cuckoo.ltraffic.co.uk** and test site comms links**.**

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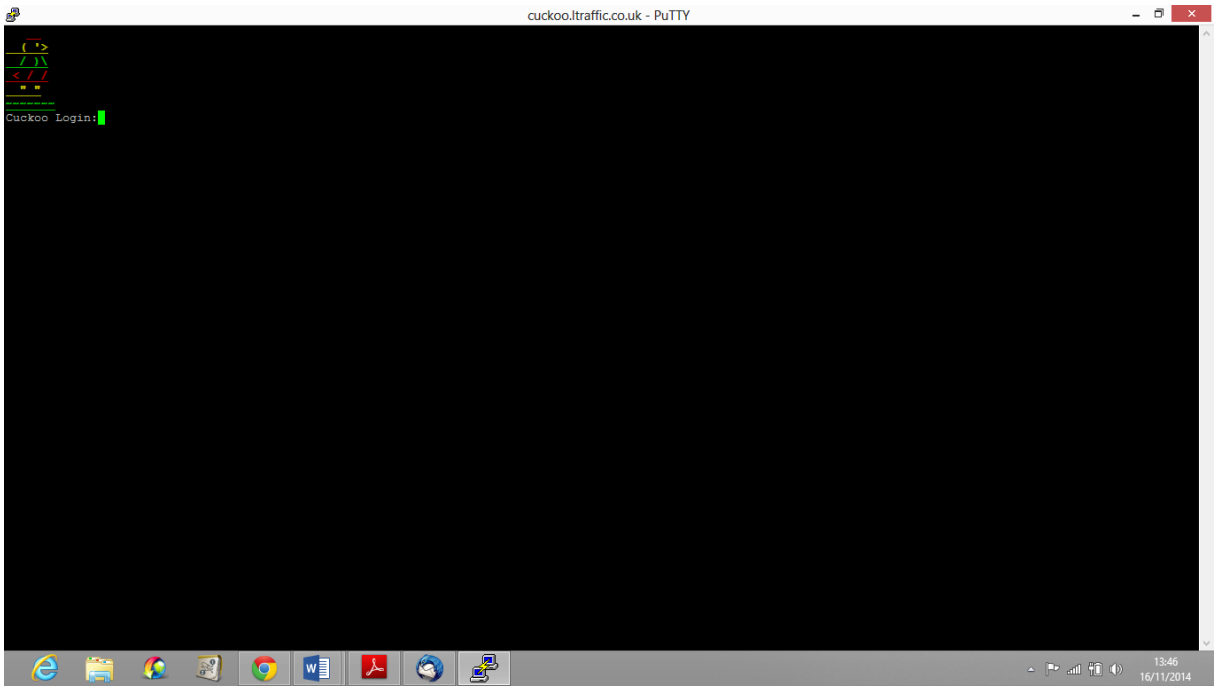
Telnet sessions NOT using the Cuckoo website can also be achieved by using any Telnet program (port 22). A user can also use a Telnet program installed on a mobile phone or Tablet to open up communication with a Cuckoo.

If the user is using a remote Telnet session then they would be required to enter the same username and password used to access the GUI (Figure 12).

Figure 12



7.3 Engineers Terminal

The Cuckoo Engineer's terminal is located at the front of the Cuckoo unit. When connecting to this terminal the user will automatically gain communication to the Traffic Controller. This will cease all polling/interrogation of the Traffic Controller and update the Cuckoo status to 'Engineer' on the GUI.

7.4 GUI Navigation

To access the Cuckoo GUI website please use the following web address cuckoo.ltraffic.co.uk

The website has a documentation area (icon situated in the top right of the website) which will guide you through navigation of the GUI cuckoo.ltraffic.co.uk/map/docs.php

Please note that all users must have their own account and that multiple users of the same account cannot login at the same time.

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8.0 Problem solving

The Cuckoo RMS is primarily server driven. Connecting to the Cuckoo's handset port will automatically direct you through to the Traffic Controllers terminal, and therefore any fault diagnosing requires checking via the Cuckoo's GUI.

All sites require pre-configuring on the GUI so when a communication connection is established, the server automatically polls the Cuckoo. If the site has been configured and the status still shows as 'Offline' then please check the following:

1. The Cuckoo has power (24VDC) and the RUN led is illuminated.
2. The Cuckoo has an IP/3G connection.
3. The Cuckoo has been configured correctly, i.e: correct controller type selected.
4. The Cuckoo's communication LED is flashing at a steady rate.

If the current site status reads 'Controller Port Unplugged', then please check the following:

1. The handset port from the Cuckoo to the controller is connected.
2. The Traffic Controllers CPU is operational and communicating.
3. The correct controller type has been configured for the site.

If the current site status reads 'Fault' then please check the following:

1. Check the 'Current Status Log' for live faults.
2. Check the I/O in case a configured bit has changed state.

If the current site status reads 'Warning' then please check the following:

1. Check the 'Current Status Log' for live warnings.
2. Check the I/O in case a configured bit has changed state.

If the system reports a battery fault, please check the following:

1. Check the Cuckoo battery LED status.
2. Check the Cuckoo's battery back-up is connected.
3. Check that the Cuckoo's PSU is operational and the specified voltage is supplied to the Cuckoo.

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9.0 Specification

Mains Supply:	90 – 264V, 50/60Hz, 30VA Maximum
CPU Operating Current:	24VDC (via dedicated din rail supply)
Operating Temperature:	-15c to 60c
Operating Power Consumption:	3 Watts

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